DOCUMENT RESUME

ED 259 622 HE 018 503

AUTHOR McClure, Maureen W.
TITLE Research Universities: Producers of Economic Development or Luxury Goods? ASHE 1985 Annual Meeting Paper.
PUB DATE Mar 85
NOTE 21p.; Paper presented at the Annual Meeting of the Association for the Study of Higher Education (Chicago, IL, March 15-17, 1985).
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Donors; *Economic Development; *Financial Support; Government School Relationship; *Higher Education; Investment; Philanthropic Foundations; Policy Formation; *Research; Research and Development; School Business Relationship
IDENTIFIERS *ASHE Annual Meeting; *Research Universities

ABSTRACT

Research that occurs in universities under conditions of patronage is distinguished from research that occurs under less distorted market conditions. It is claimed that academic research is shifting from an area of patronage consumption to one of economic development investment. In addition to considering the markets for academic research and research and development funding under conditions of patronage, implications for economic development policy are considered. Markets for research in universities under conditions of patronage have special features: patronage commonly occurs under conditions of oligopsony, where research is sponsored by a relatively small number of federal agencies, the largest foundations, and top industrial supporters; patronage implies unequal bargaining power; the patron gains indirect consumption benefits, some of which are based on exclusion; and consumption as opposed to investment is a key element of patronage. Some universities wish to decrease their dependence on federal support and are attempting to broaden their revenue base by a move toward state or regional economic development. The life sciences are used as an example of the problem of "misspecialization" of research that can create "blockages" as it flows into the economy, generating low economic growth. (SW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED259622

Research Universities: Producers of Economic Development or Luxury Goods?

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Maureen W. McClure

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

- ☑ This document has been reproduced as received from the person or organization originating it.
- ☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Maureen W. McClure
University of Pittsburgh

Presented at ASHE
March 15, 1985
Chicago, Illinois

HE018 503

ASHE Association for the Study of Higher Education
The George Washington University/One Dupont Circle, Suite 630/Washington, D.C. 20036
(202) 296-2597

This paper was presented at the Annual Meeting of the Association for the Study of Higher Education held at the Palmer House Hotel in Chicago, Illinois, March 15-17, 1985. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

Introduction

As research universities begin to plunge into the waters of economic development, their administrators may want to proceed with caution. The movement from a "patronage" environment to one of "partnership" may not come easily (Rosenweig and Turlington 1982; Smith and Karlesky 1978).

Over the next decade or two some research institutions will attempt to shift away from their traditional sources of patronage and move toward new revenue sources closer to the market (Cuilliton 1982, 1981; Fields 1981). They are attempting to broaden their revenue base and decrease their dependence on federal support. "Greenhouses" and "incubators" are springing up around these universities with mixed success. Many of these efforts are sponsored by state governments which have been investing in these sites in the hopes of generating a future tax base (NSB 1982).

Research universities seeking to attract venture capital and seed money have devised creative licensing and patent arrangements to encourage academic entrepreneurship (King 1982; 1981). The basic incentives for hiring and promotion of faculty, however, are tied more closely to a technology devised to more successfully encourage "patronage" than "partnership". Basic research in the academy has been tied closely to the missions of its principal patron, the federal government, which has encouraged a relatively open system of information, with the exception of defense. This historical involvement may impede rather than expedite a move toward state or regional economic development (Feldstein 1980).

For example, California and Massachusetts alone have captured over forty percent of Federal academic R&D funding for over forty years. Has this infusion of capital into these regions for extended periods helped create two interesting but anomalous situations in Route 128 and Silicon Valley (Wilson, et.al. 1980)?

Unfortunately, relatively little is really known about the relationship between R&D investment and regional or national capital formation. While correlations have been clearly established, causality is still indeterminate. Even less is known about the black box of academic research and its translation to economic growth. Economists have not been able to shed much light on the tension between "basic" and "applied" research in the academy because most of their models have assumed that research was a homogeneous product (Dressel and Simon 1976; Garvin; James; Verry and Davies 1976). Without clear distinctions between types of academic research, an erroneous assumption of homogeneity may mask important considerations for policies establishing incentives for research oriented toward economic development.

This paper distinguishes between the research that occurs in universities under conditions of patronage and the research that occurs under less distorted market conditions. The former contains larger shares of indirect benefits than the latter and requires a somewhat different technology for production.

The Peasant

Publically generated research funds have been chancy sources at best. A dynamic tension exists between the short-term interests of political "markets" and the longer range "payoffs" of

academic research. In the past academic research has served as an effective deflective device for difficult legislative issues. Under the pressure to "do something" for national defense after Sputnik, the National Science Foundation (NSF) became a sponsor of physics research. When Congress wanted to avoid national health care insurance legislation, it liberally encouraged the National Institutes of Health (NIH) (Strickland 1971). After the OPEC induced energy crisis of 1973 legislative attention turned toward energy research through the Department of Energy (DOE). During the Reagan administration attention has focused on engineering research through the Department of Defense.

Unfortunately, research universities are both the beneficiaries and the victims of this lumpy largesse. Grossly uneven cash flows are one of the most destabilizing problems facing these institutions. The "boom-bust" funding tide washes in new and/or expanded departments or centers, equipment and facilities tailored to meet sponsor "missions". The receding tide leaves behind expensive tenure slots without sufficient resources to maintain and upgrade depreciating human capital, equipment and facilities. Universities are often left with unhappy choices of engaging in "victim blaming" those areas of study that are no longer "fundable," regardless of original quality. This is a particularly difficult problem for research universities because of the long lead time required to produce both researcher and research. The slow pace of academic research does not mesh well with the shifting foci of legislative largesse.

R&D spending accounts for over one-fifth of the discretionary federal budget, making it quite vulnerable to political pressure. Consequently it appears unlikely that in the near term

Congressional attention will focus on the cash flow plights of research universities. These institutions, however, cannot ignore the problems created by conditions of patronage because major private research universities rely on the federal government for over three quarters of their funding, whereas state universities average about sixty percent of their total R&D funding. This addiction which set in after World War II cannot be offset by increased industrial support which accounted for well under ten percent of the R&D budgets in most universities (McClure 1983).

While there has been much discussion about "partnerships" with state governments and industries, there is an undiscussed assumption of equal bargaining power in these relationships. The tacit assumption that research universities can move easily from a realm of "patronage" to one of "partnership" requires a closer examination. "Patrons" are not "partners" because the former implies an ongoing unequal bargaining power that the latter does not. Universities seeking partnerships may require a different operating environment than those seeking patronage relationships. As most institutions will attempt to juggle both, it may not be an easy task.

Universities are in competition with industry for federal R&D funding shares. University trustees are often drawn from industry. Those industries may have been willing to subsidize academic research when researchers received publications and industry received both proprietary claims and graduates. A shift from patronage grants to shared proprietary relationships can jeopardize an intricate

balance of grants, corporate giving and alumni contributions. Most of all, partnerships that capture proprietary rights could create a worst case scenario in which the university profits little and loses both its patronage and its tax exempt status (Lepkowski 1981).

It may be useful to look at R&D funding under conditions of patronage and the markets for academic research before examining the implications for economic development policy.

Academic research as a good

University research itself can be seen as an economic good which is exchanged in price auction markets. How is academic research funded? What are the possible explanations for markets for it? Two of these will be examined.

In the first instance, the "price" of research captures all the costs and benefits and therefore the market is not distorted. This means that the buyer and seller of research complete the exchange with few spillovers. How could this happen? If the patron purchases both direct and indirect benefits from research then the process might result in a distorted market. For example, if federal, industrial or foundation sponsored grants purchased both direct benefits in the form of information related to their respective missions and indirect benefits in the form of political legitimacy, tax breaks and/or prestige, then the price might capture all of these benefits at equilibrium.

In the second instance, the "price" of research does not capture all the costs and benefits and therefore the market is distorted by the presence of externalities or spillover effects.

This is the social benefits argument which postulates that the indirect benefits that accrue to the society are so large that research has to be subsidized to bring its price and quantity to equilibrium. Public and private brokers or agents for the social welfare allocate subsidies in order to reduce the "natural" market distortion (Browning and Browning 1979; Buchanan 1968; Mishan 1971; Samuelson 1954; Tullock 1970).

In the first instance the "broker" consumes most of the "social"benefits in the form of high agency costs; in the second instance sufficient spillover exists to support agency costs and still produce significant social benefits.

The benefits to academic research are difficult to measure in the abstract, and their contribution to economic, political and cultural development can be more perceptual than empirical. Until clearer evidence arises to firmly substantiate either view or a weighted combination of each, neither instance can be clearly rejected. Research under conditions of patronage, therefore, assumes that either instance can exist and that brokers for social welfare may capture substantial indirect benefits because of the difficulty of measuring and monitoring social welfare. It cannot be assumed that patrons act efficiently as brokers for the social welfare.

If patrons do capture large amounts of indirect benefits because of the loose coupling between research and development, efforts to change that structure may result in resistance on the part of the patrons to a perceived wealth loss caused by a move toward "partnership".

Research under conditions of patronage

Markets for research in universities under conditions of patronage have special features. First, patronage commonly occurs under conditions of oligopsony. Most federal research is sponsored by six agencies: HHS, NSF, DOD, DOE, NASA and USDA. The ten largest foundations sponsor about one half of that sector's efforts (McClure). The top ten industrial supporters of university research accounted for 45 percent of the total (NSB 1982). Conditions of oligopsony can greatly increase the value of "contacts" who can lower information and transactions costs to producers of research.

Second, patronage implies unequal bargaining power. The patron has continuous access to economic and political resources not available to the researcher, despite the researcher's talent. Researchers must eat; patrons can live without scholarship.

Third, when exchange occurs under conditions of patronage, there is a large component of indirect consumption benefits that accrue to the patron. Becker refers to these benefits as markets for "altruism," although they could easily be markets for prestige, political deflection, or legitimacy (1976). These indirect benefits could be defined in terms of internal or external consumption. Internal consumption would be the personal pleasure derived from the exchange, as in an anonymous gift. External consumption occurs where the donor receives indirect benefits from the larger community in the form of tax breaks, greater prestige, or political legitimacy (Boulding 1973). In both instances,the conditions of exchange are less under control for the researcher than they would be under direct

market conditions. Researchers could produce excellent work according to the standards of the field but if they have insufficient "cachet", they may be overlooked for someone who might produce lower quality work but has greater "cachet".

Fourth, some of the indirect benefits that accrue to patrons are based on exclusion. Prestige and political legitimacy only have value under conditions of exclusion. Goods which have exclusion conditions may be called "luxury goods". For example, a patron like NI might sponsor health research. The direct benefits of "mission" sponsored research would follow the diminishing marginal utility of a normal good. The politically legitimacy that would accrue to the agency by sponsoring research at a major private research university may create indirect benefits generated by exclusion. The agency can then claim that they sponsored a "first class" attack on the diseases of interest.

The purchase of luxury goods goes not imply that they are "over-priced". Quite the contrary, the more exclusionary benefits that can be derived from the exchange, the more valuable they are. This also does not imply that, at the margin, luxury goods are not qualitatively superior to others, only that incremental benefits, at the margin, are quite costly.

Under conditions of patronage the indirect consumption benefits and potential exclusion benefits are relatively large. These exchanges imply restricted markets with high barriers to entry. Successful research universities which are able to capitalize their

"goodwill" or "cachet" and can restrict entry through high startup costs have strong competitive advantages. Even so, their limited bargaining power may leave them relatively powerless against the shifting whims of patrons.

Finally, consumption as opposed to investment is a key element in patronage. Patrons consume prestige, political legitimacy or altruism. This contrasts with the emphasis on investment in an arena of economic development. Under conditions of patronage, the patron purchases research in order to derive indirect consumption benefits.

Economic investment on the other hand, requires a much tighter coupling of benefits between sponsor and researcher. Research is not seen as an expensive serendipitous process of "pushing back the frontiers of knowledge" funded by benevolent patrons with the hopes of a payoff "someday" (Thomas 1981). Instead it is seen as an "intermediate produce" which leads more directly toward economic payoffs. Monitoring costs are much higher for proprietary interest than for patronage.

Markets for Academic Research: Problems

Under conditions of patronage one would expect to find distortions that would not occur in traditional markets for economic goods. These distortions may lead to research which cannot be translated easily into economic development. One problem is the "misspecialization" of research which can create "blockages" as it flows into the economy, generating low economic growth.

The life sciences provide a clear example of the dilemma. Sponsored by congressional desires to avoid national health insurance, considerations for health-related economic spinoffs were

at best, tangential. As a consequence, by 1980 the life sciences had grown all out of proportion to what the economy could absorb beyond federal sponsorship. They represented 60 percent of the full-time equivalent (FTE) R&D scientists and engineers employed in universities and colleges (NSF 81-311, 67). They also represented almost three-fourths of all employed doctoral scientists and engineers in the life sciences. Only sixteen percent were employed in industry, with the other ten percent employed by the federal government. Almost 85 percent of all doctoral scientists and engineers worked in an arena sponsored by direct federal funding. There was little room for movement into the private sector. Cutbacks in federally sponsored health research would find only relatively small industry support.

In addition, the life sciences were producing at a relatively rapid rate. In 1975 approximately 4,500 doctoral degrees were awarded or roughly 6 percent of the total number of life scientists. At that level the field will double in sixteen years. Where will they go?

Reagan's major R&D budget increases are targeted for the physical sciences not for the life sciences. Biotechnical firms are developing slowly despite promised potential (Garfield 1981). One can only hope that state sponsored R&D efforts will encourage more rapid technical transfer. State investments at present are relatively small compared to federal budgets.

While distortions created by federal patronage may alone inhibit an academic research shift toward more tightly coupled linkages to economic development, there are other problems. Clear,

strong, causal linkages between R&D investment and economic development have not yet been established, despite the visible, successful operations found in certain regions.

A basic "problem" with academic research is its loose linkages with the formation of capital stock. Researchers are encouraged to produce knowledge which can be shared publically. Patrons contributed to research for reasons other than direct market applications and proprietary claims. Indeed, the ascetic traditions of the academy have created a culture which eschews the proprietary values of marketplace competition. These cultures will not mix readily, nor is it certain that the mix can often be mutually profitable. This argument moves beyond the well established differences between basic and applied research.

For example, international differences in productivity are not connected with international R&D spending; however, they are correlated with initial productivity and rate of growth of capital stock (Nelson 1981; Mansfield 1968a, 1968b; Scherer 1970). This is a crucial point because the growth of R&D capital stock is determined primarily by private sector investment in knowledge with potential property rights. Rosenberg claims that science is not exogeneous to the development of technology, in part because of the property rights issues (1982). Solo also found that breakthroughs in the synthetic rubber industry were closely tied to incentives for property rights (1982). Investment in university research which leads to "public knowledge" may lead to an <u>international</u>, rather than domestic, accumulation of capital stock.

Federal and state subsidization of university research will generate a very "leaky" system of investment. Those who wish to invest must account for these leakages. In the past, it was assumed that basic research leaked, but applied research and development could led to privatization of property rights. While this principle still holds, the ease of international technical transfer complicates the issue of national or regional subsidization of research in the hope of generating capital stock. Decades of federal investment in biotechnical research have had leaky payoffs in applied research and development. The Hoescht agreement at Harvard and the European and Japanese licensing agreements at Genetech are only two examples of federal R&D funding leading to development captured by others.

These leaks are especially costly because federally funded academic research has been invested in areas with relatively low economic growth potential: health, defense and space (Terleckyj 1977). Even with the American investment in health research, the leadership in the areas of greatest potential biotechnical markets is claimed by Australian agricultural genetics (Biotechnology 1984). Federally funded defense related R&D has spent most of its investment in development of prototypes with a relatively few resources for either basic research at universities or for direct cultivation of capital formation. Industry may have good reasons for not supporting large scale domestic research in addition to the proprietary problems mentioned earlier. Economic development may also not rely much on academic research, resulting more from "bottom-up" transfer than from research based on "top down" transfer (Rosenberg 1982; Sobol 1980). As an example, multinationals found that offshore development

generated greater productivity than domestic basic research (Hirschey and Caves 1981). Fusfield found that corporations sponsor academic research more for access to potential "manpower" than for proximity to ongoing research (NSB 1982). Increases in industrial investments in academic research under the Reagan administration may be as closely connected to the tax incentives generated by the Economic Recovery Tax Act (ERTA) as to internally generated incentives. This act expires in December 1985.

The move toward greater state funding of university research, on the other hand, is tied to regional economic development more closely than either federally, or industrially, sponsored R&D. Many states governments already have long-standing relationships with university research in areas tied to regional development. Some land grant schools have established records of careful balances between "basic research" and economic development, particularly in the areas of agriculture and mining. Arizona has invested in competitive optics research, Pennsylvania in robotics, New York and California in graphics. States may prove to be better able to focus their investments in competitive economic development than the federal government. If so "industrial policy" may be more effectively pursued at the state level than at the national level (Bowles, Gordon and Weisskopf 1984; Bluestone and Harrison 1982; Magaziner and Reich 1982).

The development of internationally competitive regional "industrial policies" may require research universities to rethink their current federal funding relationships and advocate federal

funding for academic research that can be more closely coupled to economic development. These universities would also have to reexamine their currently funded research to see how much is likely to lead toward international, domestic and regional accumulation of capital stock.

Conclusion

Academic research is shifting from an arena of patronage consumption to one of economic development investment, spurred on by a transitional economy. Those universities seeking to further their positions within the markets for patronage particularly in the areas of defense and health related R&D will invest their resources in "contacts" in order to lower their information and transaction costs in an oligopsonist market. The move toward legislative "set asides" can be seen as an example of this behavior. One would also expect to see increases in staff to pursue those contracts and larger shares of administrative time devoted to those activities. Because of the high barriers to entry there will be relatively few players in this area. Intense competition for scarce resources may drive out marginal players. The rest will be enhancing their cachet.

Those universities pursuing economic development may do so by either encouraging patronage under the rubric of "development for jobs", and/or by seeking to establish sources of revenue other than those of patronage. Patronage seekers may not have to create substantial internal changes in their universities' incentive structures; those seeking to capture proprietary benefits almost

certainly will have to reconsider methods of values conflict resolution beyond the add on principle of institute formation. Greater creativity will be required for long term involvement in the process of capital formation.

Finally, there is the larger issue of university leadership in the economic development process. A federal role in the formation of a national economic development policy carried out like past efforts may lead to distortions in much the same way that is "patronage" of health and defense related research funding. The role of research universities in "partnership" with the state, business and labor might prove to be more promising if they can help coordinate private and public investment toward the generation of a diverse tax base consistently over time. Research universities which rely on the economic strengths of the region for survival support are emerging as central policy leaders in this process. The Universities of Texas and Minnesota are only two notable examples of this reform leadership. While the barriers to entry will remain high for patronage markets, the emerging opportunities for economic development may be much more open.

The end of the century may discover that a small group of research universities are investing in cachet and contacts through focused incentives to attract a very unlimited range of funding sources. Another small group of research universities may have grown to be more self sufficient than the former group because of their diverse sets of internal incentive structures and external sources of incomes. A third set maybe gradually fading away.

Bibliography

Becker, G.S. 1976. The economic approach to human behavior. Chicago: University of Chicago Press.

Biotechnology 1984. High Technology Industries: Profiles and Outlooks. C61.2T22/6. International Trade Administration (July). Washington, DC: U.S.Department of Commerce.

Bluestone, B. and B. Harrison. 1982. The Deindustrialization of America. New York: Basic Books.

Browning, E.K. and J.M. 1979. Public finance and the price system. New York: Macmillan.

Boulding, K.E. 1973. The economy of love and fear. Belmont, CA: Wadsworth.

Bowles, S., D.M. Gordon and T.E. Weisskopf. 1984. Beyond the wasteland. Garden City, NY: Anchor Books.

Buchanan, J.M. 1965. The demand and supply of public goods. Skokie, IL: Rand McNally.

Cuilliton, B.J. 1981. Biomedical research enters the marketplace. The New England Journal of Medicine. 304(20) May 14:1195-1201.

Cuilliton, B.J. 1982. The academic-industrial complex. Science 216(28) May:960-962.

Dressel, P. and L.A.K. Simon. 1976. Allocating resources among departments. New Directions for Institutional Research #1, Autumn. San Francisco: Jossey-Bass.

Feldstein, M. 1980. The American economy in transition. Chicago: The University of Chicago Press.

Fields, C.M. 1981. Incentives called necessary for industry to invest in university genetic research. Chronicle of Higher Education. XXII(17)June 15:9+.

Garfield, E. 1981. The economic impact of research and development. Current Contents 24(51) December 21:5-15.

Garvin, D.A. An economic analysis of university behavior thesis. Massachusetts Institute of Technology.

Hirschey, R.D. and R.E. Canes. 1981. Research and transfer technology by multinational enterprises. Oxford Bulletin of Economic Statistics. 43(2) May:115-30.

James, E. The university department as a non-profit labor cooperative. Carnegie Mellon University.

King, J. 1981. Some highlights on research corporations. Funding News. University of Rochester 4(7), August.

King, J. 1982. Intellectual property summary. Draft, University of Rochester, June 29.

Lepkowski, W. 1981. Research universities face new fiscal realities. Chemical and Engineering News. November 23:23-32.

Magaziner, I.C. and R.B. Reich. 1982. Minding America's business. New York: Vintage Books.

Mansfield, E. 1968a. Industrial research technological innovation. New York: W.W. Norton.

Mansfield, E. 1968b. The economics of technical change. New York: W.W. Norton.

McClure, M. 1983. Constraints to mid-range planning for university R&D. Thesis. University of Rochester.

Mishan, E.J. 1971. Cost-Benefit Analysis. New York: Praeger.

NSB. National Science Board. 1982. University-industry research relationships. NSB82-2. Washington, DC: National Science Foundation.

Nelson, R.R. 1981. Research on productivity growth and productivity differences. Journal of Economic Literature. 2(19) September: 1029-1064.

NSF 81-311. National patterns of science and technology resources. Washington, DC: National Science Foundation.

Questions and answers with Dr. Donald Kennedy on professors as entrepreneurs. 1982. Venture, August.

Rapoport, A.R. et.al. 1977. The production and application of new industrial technology. New York: W. W. Norton

Research universities and the national interest. 1978. New York: The Ford Foundation.

Rosenweig, R.M. and B. Turlington. 1982. Research universities and their patrons. Berkeley: University of California Press.

Samuelson, P.A. 1954. The pure theory of public expenditure. Review of Economics and Statistics. 36(4) November: 387-389.

Sobol, D. 1980. Research, development and technical innovation. New York: Heath.

Solo, R. 1982. Across the high technology threshold.

Scherer, F.M. 1970. Industrial market structure and economic performance. Chicago: Rand McNally.

Smith, B.R. and J.J. Karlesky. 1978. The state of academic science. New York: Change Magazine Press.

Strickland, S.P. 1971. The integration of medical research and health policy. Science. 173(4002) September 17:1093-1103.

Snyder, R. 1982. On the economics of philanthropy. The Economic Journal. 92(June):34-35.

Terleckyj, N.E. (ed.) 1977. The state of science and research. Boulder, CO: Westview Press.

Thomas, L. 1981. The value of basic science. Rochester Review. University of Rochester, Summer.

Tullock, G. 1970. Private wants, public means. New York: Basic Books.

Wilson, R. et.al. 1980. Innovation, competition and government policy in the semiconductor industry. Lexington, MA: Lexington Books.

Vagtborg, H. 1976. Research and American industrial development. New York: Pergammon Press.

Verry, D. and B. Davies. 1976. University costs and outputs. Amsterdam: Elsevier.